

Scientific Review Paper: Seaweed, Iodine and Beauty from Within

Summary

Iodine is an essential nutrient, yet Europe is now considered an iodine deficient continent. Without sufficient iodine, the thyroid cannot work properly, which in turn can result in dry and flaky skin, limited hair growth or even some hair loss. Nails are also impacted and can become weak and brittle.

The addition of a natural iodine source to nutrition products results in noticeable beauty benefits with hair, skin and nails, including EFSA Approved Health Claims.

Seaweed is the only natural and plant-based source of essential iodine, with the only other sources being fish and dairy, making PureSea® seaweed an ideal ingredient for nutricosmetic formulations.

Abstract

Seaweed is used extensively in topical beauty products such as face creams, with various benefits. In addition to being applied topically, seaweed for food and supplements has advantages nutritionally for beauty-from-within. This centres largely around iodine, which is an essential nutrient that has to be obtained through the diet.

Iodine is needed in the creation of thyroid hormones, which are required to regulate the metabolism and have a direct effect on cellular renewal. Having too much or too little iodine in the diet can cause thyroid dysfunction, resulting in negative impacts on health. Being deficient in iodine can cause hypothyroidism (an underactive thyroid), which has common symptoms including hair loss, dry skin, and brittle hair and nails.

In relation to the benefits of including enough iodine in the diet, the European Food Standards Agency (EFSA) has approved six health claims for products providing good sources of iodine. These health claims include supporting normal thyroid function, metabolism and skin health. Seaweed is the only good natural, plant-based source of

iodine and can easily be incorporated into the diet through supplementation or as an ingredient in food and beverages.

Iodine deficiency is a significant and growing issue across Europe. In the UK for example, females in particular do not consume enough iodine to ensure adequacy. Groups such as adolescents, teenage girls, pregnant and breastfeeding women, older women, and those following a plant-based or flexitarian diet can be at the highest risk.

Iodine

Iodine is an essential nutrient that cannot be produced in the body and so must be consumed as part of the daily diet. The reference nutrient intake (RNI) for Iodine in the UK is 140µgⁱ. However, the European Food Safety Authority (EFSA) recommend a daily intake of 150µg and a further 50-100µg for women that are pregnant and breastfeedingⁱⁱ.

The most common sources of iodine are fish (white fish specifically) and dairy products, particularly milk and yogurt. With a general decline in fish and dairy intake - especially in plant-based and flexitarian diets - the risk of iodine deficiency is greater than ever before. This is in addition to an already iodine deficient population in various countries in Europe, particularly the UK. The only food that can provide a good natural, plant-based source of iodine is seaweed.

Seaweed is a staple within Asian cuisine and is a factor often associated with Japan having one of the highest life expectancies in the worldⁱⁱⁱ. In the West, seaweed has become somewhat of a forgotten food. However, the trends are showing a sharp increase in the recognition of seaweed as a natural, healthy and nutritious food.

Iodine is needed for the production of thyroid hormones, which are known as T3 (triiodothyronine) and T4 (thyroxine)^{iv}. Once these hormones are synthesised by the thyroid, they are released into the blood stream and have a number of roles within the body. Since iodine is essential for healthy thyroid function, insufficient intake can lead to hypothyroidism (an underactive thyroid). One of main roles of the thyroid hormones is regulating metabolic rate – a higher level of thyroid hormones causes an increase in rate, and a lower level results in a decreased metabolic rate. The latter is the most common, due to the high prevalence of iodine deficiency.

Iodine deficiency is a global public health concern, even in developing countries. The UK currently ranks seventh among the ten most iodine-deficient nations in the world, and one of only two high income countries on the list^v. In 2021, the Iodine Global Network reported, from an EU funded study, that Europe is an iodine deficient continent^{vi}. Furthermore, a study in The Lancet showed there are 5 billion people globally deficient in iodine – this corresponds to 68% of the world's population^{vii}. Those following a plant-based diet have been identified as particularly at risk from experiencing iodine deficiency^{viii}.

Hair Loss

Severe and prolonged hypothyroidism and hyperthyroidism can cause hair loss^{ix}. Hair growth normally returns following treatment, and it may take several months to experience hair loss or growth due to the nature of the hair's long-life cycle. The first evidence was presented in 2008 that demonstrated that the thyroid hormones T3 and T4 directly "modulate multiple hair biology parameters, ranging from hair follicle cycling to pigmentation"^x.

There is evidence to suggest that when thyroid levels are low the rate at which hair grows can be reduced and even stop completely - over prolonged periods this may result in hair loss. The exact mechanism is unknown, but it is believed to be related to the thyroid hormone receptor being expressed in the human hair follicle^{xi}. Therefore, it is unsurprising that there are cases of patients who have suffered from iodine deficiency disorders and who experience hair loss^{xii}. In a study of 700 participants, it was found that 30% of those that presented with low thyroid hormone levels stated that they had experienced some form of hair loss^{xiii}.

Nails

Nail health can be impacted by thyroid issues, with one reason for this being that a reduced metabolic rate impacts the amount of sweat produced by the body. Sweat plays a role in maintaining the moisture of the skin and nails and in its absence, it can cause them to become dry and brittle^{xiv}.

In more extreme cases, a condition known as onycholysis can occur. This has been reported in people suffering from both hypothyroidism and hyperthyroidism and is a condition which causes the nail to become separated from the nail bed^{xv}. This condition is also often referred to as 'Plummer's nails'^{xvi}.

Dry, Flaky Skin

Another common symptom of iodine deficiency is dry, flaky skin^{xvii}. This is because thyroid hormone signalling is essential for skin physiology and homeostasis^{xviii}. Thyroid conditions affect the skin in 3 ways: (1) direct action of thyroid hormone on skin tissues, (2) skin manifestations of direct thyroid hormone action on non-skin tissues and (3)

autoimmune skin disease associated with thyroid dysfunction of autoimmune aetiology^{xix}.

In one study, dry skin was reported in 63% of people classified with hypothyroidism^{xx}. This has been attributed to a lowered rate of skin cell regeneration as a result of lower thyroid hormone levels^{xxi}.

Conclusion

Iodine is an essential nutrient for normal thyroid function, which subsequently has direct and indirect impacts on hair loss, nail health and an EU Approved Health Claim relating to normal skin health. In various countries, and specifically the UK, there are serious issues of iodine deficiency, and more so for those with plant-based and flexitarian diets. Seaweed, of the right species, is the only good natural, plant-based source of iodine.

A viable solution to address iodine deficiency using seaweed is the PureSea® range of seaweed ingredients.

PureSea® seaweed is sustainably wild harvested from the pristine Scottish Outer Hebrides and is carefully processed using proprietary technologies to ensure it is a safe natural source. The PureSea® range is organic, vegan and Kosher certified, with each batch tested for safety, quality and nutrition – specifically iodine levels. The range is delivered in powder and granule formats ensuring ease-of-use and application in almost any food, beverage or nutrition product to deliver nutrition, health and flavour benefits.

A small inclusion of PureSea® seaweed (100mg) allows for a good source of iodine health claim to state that it supports normal:

- Healthy Skin
- Thyroid Health
- Energy Yielding Metabolism
- Development in Children
- Cognitive Function
- Nervous System

About the Authors

Dr Craig Rose is a marine biologist, founder and managing director of Seaweed & Co. Craig has worked commercially and on research projects on the benefits of seaweed for around 15 years, and leads several research projects with university partners, is on industry advisory bodies and has presented at numerous conferences and to the media.

Sarah-Jane Hall is a Registered Associate Nutritionist, with a degree in Human Nutrition and a master's degree in Public Health Nutrition. Sarah-Jane is the in-house Nutritionist at Seaweed & Co. and has conducted research on various aspects of nutrient deficiency – specifically iodine deficiency.

Seaweed & Co. as a company advise on, supply and accredit seaweed, using proprietary technologies and techniques. Their Organic and Kosher certified PureSea® seaweeds are supplied into the food, health and nutrition markets. Their seaweeds are sustainably wild harvested, naturally rich in iodine, uniquely DNA Authenticated for world class analytical traceability, and extensively batch tested and accredited for safety and quality.

FOR ADDITIONAL INFORMATION ON PURESEA®



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